FR. Conceicao Rodrigues College Of Engineering
Father Agnel Ashram, Bandstand, Bandra-west, Mumbai-50
Department of Humanities & Sciences

F.E. (A) (semester II) (2020-2021)
Lesson Plan

Subject: Applied Mathematics II (FEC201) **Credits-4**

Syllabus:

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Tut.	Pract.	Total
FEC201	Engineering Mathematics-II	3	--	1*	3	1	--	4

Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Pract. /oral	Total
		Internal Assessment			End Sem. Exam.	Exam. Duration (in Hrs)			
		Test1	Test 2	Avg.					
FEC201	Engineering Mathematics-II	20	20	20	80	3	25	--	125

Objectives

1. The course is aimed to develop the basic Mathematical skills of engineering students that are imperative for effective understanding of engineering subjects. The topics introduced will serve as basic tools for specialized studies in many fields of engineering and technology.
2. To provide hands on experience in using SCILAB software to handle real life problems

Outcomes:

Learners will be able to…

1. Solve various types of First Order differential equation.
2. Solve various types of Higher Order Differential equation.
3. Illustrate the concepts of Beta and Gamma function,DUIS and rectification.
4. Apply the concepts of Double integral
5. Apply the concept of Triple integral.
6. Apply the principles of Numerical Method for solving differential equation and numerical integration analytically and using Scilab also.

Module	Detailed Contents	Hrs.
01	**Differential Equations of First Order and First Degree** Exact differential Equations, Equations reducible to exact form by using integratingfactors. Linear differential equations (Review), equation reducible to linear form, Bernoulli'sequation. **# Self learning topics:**Simple application of differential equation of first order and first degree to electrical and Mechanical Engineering problem	4 2
02	**Linear Differential Equations With Constant Coefficients and Variable CoefficientsOf Higher Order** Linear Differential Equation with constant coefficient- complementary function,particular integrals of differential equation of the type f(D)y = X where X is ( ) ( ) . Method of variation of parameters. **# Self learning topics:** Cauchy's homogeneous linear differential equation and Legendre's differential equation, Applications of Higher order differential equation.	4 2
03	**Beta and Gamma Function, Differentiation under Integral sign and Rectification** Pre-requisite: Tracing of curves Beta and Gamma functions and its properties. Differentiation under integral sign with constant limits of integration.	2
	1.3 Rectification of plane curves.(Cartesian and polar) **# Self learning topics:** Rectification of curve in parametric co-ordinates.	2 2
04	**Multiple Integration-1** Double integration-definition, Evaluation of Double Integrals.(Cartesian &Polar) Evaluation of double integrals by changing the order of integration. Evaluation of integrals over the given region. (Cartesian & Polar) **# Self learning topics:** Application of double integrals to compute Area, Mass.	2 2 2
05	**Multiple Integration-2** Evaluation of double integrals by changing to polar coordinates. Application of double integrals to compute Area Triple integration definition and evaluation (Cartesian, cylindrical and spherical polarcoordinates). **# Self learning topics:**Application of triple integral to compute volume.	2 2 2
06	**Numerical solution of ordinary differential equations of first order and first degree, and , Numerical Integration** Numerical solution of ordinary differential equation using (a) Euler's method (b) Modified Euler method, (c) Runge-Kutta fourth order method Numerical integration- by (a) Trapezoidal (b) Simpson's 1/3rd (c) Simpson's 3/8th rule(all with proof). **# Self learning topics:** Numerical solution of ordinary differential equation using Taylorseries method.	3 3

Term Work

General Instructions:

1. Batch wise tutorials are to be conducted. The number of students per batch should be as per University pattern for practicals.
2. Students must be encouraged to write SCILAB Programs in tutorial class only. Each Student has to write at least 4 SCILAB tutorials (including print out) and at least 6 class tutorials on entire syllabus.
3. SCILAB Tutorials will be based on (i) Euler Method, (ii) Modified Euler Method, (iii) Runge-Kutta Method of fourth order , (iv) Trapezoidal Rule , (v) Simpson's 1/3rd Rule
   (vi) Simpson's 3/8th rule

The distribution of marks for term work shall be as follows:

- Class Tutorials on entire syllabus **: 10marks**
- SCILAB Tutorials **: 10 marks**
- Attendance (Theory and Tutorial) **: 05 marks**

The final certification and acceptance of TW ensures the satisfactory performance of laboratory work and minimum passing in the TW.

Assessment

Internal Assessment Test

Assessment consists of two class tests of 20 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

End Semester Examination

In question paper weightage of each module will be proportional to number of respective lecture hours as mention in the syllabus.

1. Question paper will comprise of 6 questions, each carrying 20 marks.
2. Question number 1 will be compulsory and based on maximum contents of the syllabus
3. Remaining questions will be mixed in nature (for example, if Q.2 has part (a) from module 3 then part (b) will be from other than module 3)
4. Total four questions need to be solved.

References

1. Higher Engineering Mathematics, Dr. B. S. Grewal, Khanna Publication
2. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley Eastern Limited, 9th Ed.
3. Engineering Mathematics by Srimanta Pal and Subodh,C. Bhunia, Oxford University Press
4. Applied Numerical Methods with MATLAB for Engineers and Scientists by Steven Chapra, McGraw Hill

Course Outcomes:

Upon completion of this course students will be able to:

1. Solve first order and higher order differential equations.
2. Apply Beta-Gamma functions to solve integration problems.
3. Rectify the given curve(using Cartesian, polar and parametric form)
4. Apply the concept of multiple integrals to find area of the given region and mass of given lamina.

Mapping of CO and PO/PSO

Relationship of course outcomes with program outcomes: Indicate 1 (low importance), 2 (Moderate Importance) or 3 (High Importance) in respective mapping cell.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
FEC201.1	**3**											
FEC201.2	**2**											
FEC201.3	**2**											
FEC201.4	**3**											
TOTAL												
CO-PO MATRIX												

Justification

PO1: COs are mapped to this PO1 because the students gain basic knowledge on mathematical concepts required for higher semesters (mathematics and technical application)

CO Assessment Tools:

	Indirect Methods								
	T-1	**T-2**	**T-3**	**T-4**	**T-5**	**TEST 1**	**TEST 2**	**Uni. Exam**	**Course Exit Survey**
CO1	20%	20%				30%		30%	100%
CO2			70%					30%	100%
CO3				40%			30%	30%	100%
CO4					40%		30%	30%	100%

CO	CO Statement	CO Target	Target Range
CO 1	Solve first order and higher order differential equations.	70% Students Scoring 70% of Marks	2.5
CO2	Apply Beta-Gamma functions to solve integration problems.	70% Students Scoring 70% of Marks	2.5
CO3	Rectify the given curve using Cartesian, polar form)	70% Students Scoring 70% of Marks	2.4
CO4	Apply the concept of multiple integrals to find area of the given region	70% Students Scoring 70% of Marks	2.4

LECTURE PLAN OF FE A SEM 2				2020-2021
SR NO	TOPIC	PLAN DATE	ACTUAL DATE	CO
1	Introduction to Differential Equation	5/5/2021	5/5/2021	CO1
2	Exact differential equation, Integrating factor	6/5/2021	6/5/2021	CO1
3	Integrating factor and problems on that	7/5/2021	7/5/2021	CO1
4	Linear Differential Equation	10/5/2021	10/5/2021	CO1
5	Bernoulli's Differential Equation	11/5/2021	11/5/2021	CO1
6	Reducible to Linear Differential Equation	12/5/2021	12/5/2021	CO1
7	Higher order Differential Equation with constant coeff.	14/5/2021	14/5/2021	CO1
8	Homogeneous ,Non Homog Differential Equation	17/5/2021	17/5/2021	CO1
9	Particular Integral	19/5/2021	19/5/2021	CO1
10	Particular Integral	20/5/2021	20/5/2021	CO1
11	Problems on Particular Integral	21/5/2021	21/5/2021	CO1
12,13	Practice Problems on above	24/5/2021, 25/5/2021	24/5/2021, 25/5/2021	CO1
14	Variation of Parameters	27/5/2021	27/5/2021	CO1
15	Introduction to Gamma Function	28/5/2021	28/5/2021	CO2
16	Examples on Gamma Function	31/5/2021	31/5/2021	CO2
17	Introduction to Beta Function	1/6/2021	1/6/2021	CO2
18	Problems on Beta Function	2/6/2021	2/6/2021	CO2
19	Problems on Beta Function	3/6/2021	3/6/2021	CO2
20	Tracing of Curves	7/6/2021	7/6/2021	CO3
21	Rectification (cartesian form)	8/6/2021	8/6/2021	CO3
22	Rectification (cartesian form)	9/6/2021	9/6/2021	CO3
23	Polar form	10/6/2021	10/6/2021	CO3
24	Introduction to Double Integration	16/6/2021	16/6/2021	CO4
25	Evaluation of Double Integration	17/6/2021	17/6/2021	CO4
26	Find the limits of the region of integration	18/6/2021	18/6/2021	CO4
27	Change the order of integration	21/6/2021	21/6/2021	CO4
28	Change the order of integration	23/6/2021	23/6/2021	CO4
29	Change to polar	24/6/2021	24/6/2021	CO4
30,31	Change to polar	25/6/2021 28/6/2021	25/6/2021 28/6/2021	CO4

32	Area of the region	29/6/2021	29/6/2021	CO4
33	Area of the region	30/6/2021	30/6/2021	CO4
34	Practice on Double Integration	1/7/21	1/7/21	CO4
35	Triple Integration(evaluation)	5/7/2021	7/7/2021	CO4
36	Spherical coordinates	6/7/2021	8/7/2021	CO4
37	Practice on Triple Integration	7/7/2021	12/7/2021	
38	DUIS	8/7/2021	13/7/2021	

	AppliedMathematics 2
	List of Tutorials
Sr. No	
1.	Differential Equation of order 1
2.	Differential Equation of higher order with constant coefficient
3.	Beta Gamma Functions
4.	Rectification
5.	Evaluate double Integration

4.3 Tutorial Plan

	DIVISION -A			
	SEMESTER- II			
Tut.No	Topic Planned	Planned Date	Actual Date	Mapped with CO
	BATCH-A,B,C			
1	Differential Equation of order 1	28/5/21	28/5/21	CO1
2	Differential Equation of higher order with constant coefficient	4/6/21	4/6/21	CO1
3	Beta Gamma Functions	11/6/21	11/6/21	CO2
4	Rectification	22/6/21	22/6/21	CO3
5	Evaluate double Integration	2/7/21	2/7/21	CO4